CHECKING MANUAL FOR RIBES ERADICATION

IN

CALIFORNIA, 1935

Division of Plant Disease Control
Bureau of Entomology and Plant Quarantine
102 Administration Building, Government Island
Oakland, California
May 1, 1935

CHECKING MANUAL FOR RIBES ERADICATION IN CALIFORNIA
1935

TABLE OF CONTENTS

APPENDIX

CHECKING MANUAL
FOR RIBES ERADICATION IN CALIFORNIA
1935

I. Introduction.

The purpose of this manual is to instruct checkers in the methods and procedure of taking and compiling checking data, and in all the details of the work in which they are engaged. It is the duty of members of the checking organization to study this handbook and refer to it constantly throughout the summer in order that their work and final records shall be satisfactory; it is not to be read once and laid aside.

The manual goes into considerable detail for the benefit of the beginner, but it will bear careful study by the more experienced man since many sections have been amplified and procedures clarified, particularly those relating to records and maps. To those men beginning checking for the first time the descriptions of procedures may be confusing and the work may seem difficult and complicated. Such is not the case, however; checking is not difficult, but it is essential that it be done carefully, accurately, and systematically. By and large, checking, through the inspection of eradication areas by a sampling process, involves two fundamental steps:

1. Running strips through eradication areas to find Ribes bushes.

2. Showing where these bushes were found along the strip.

Regarding checking in this light, it is neither difficult nor highly technical. The detailed information presented here provides for a systematic method of performing these two principal steps, and in order to insure the accuracy and usefulness of the data secured, this standard procedure must be followed.

II. Definition and Purpose of Checking.

A. Checking is the systematic inspection of an area following Ribes eradication to obtain the distribution, the number, and the feet of live stem of Ribes remaining on that area. Its purpose is to measure the thoroughness of the eradication job from which can be gauged the degree of protection given the sugar-pine stand. Work done with this object in view is hereafter known as regular checking.

B. Checking also includes the inspection of certain areas prior to Ribes eradication to show the distribution and number of bushes present in order that areas low in Ribes population may be eliminated from crew work. This is referred to as advance checking.

III. Types of Checking.

A. Regular check. This check is conducted on all areas worked by eradication crews and may be divided into three separate parts or operations designated as follows:

1. Upland check is the examination of all eradication types with the exception of stream type.

2. Stream type check is the inspection of all streams designated and worked as stream type by the eradication men.

3. Recheck. When areas are reworked by eradication crews to reduce them to the desired standard of control, a recheck is necessary. As many rechecks are made as there are reworkings.

B. Advance check is the inspection of certain areas before Ribes eradication in order to obtain information on the occurrence of Ribes for the use of the eradication personnel, particularly with a view to blocking out areas suspected of being relatively Ribes free.

IV. Description of Methods.

A. General. Checking is based upon the method of sampling. If a sufficient number of sample plots are taken systematically over a large area, the data thus collected can be considered as representative of the whole and can be applied to the entire area.

The standard system of checking embodies the use of the strip, composed of consecutive transects (plots) one chain long by 1/4 chain wide, with the direction of the strip determined by compass and the distance by pacing. The transect is the basic sample plot and the unit for recording Ribes data. The checker, working alone, runs compass, paces, and records data.

The size of the checking unit may vary according to field conditions, but wherever possible the quarter section (160 acres) should be used. If in specific cases checking work is facilitated by using the half section (320 acres) or the section (640 acres) as the unit, this may be done.

Five eradication types are recognized in Ribes eradication work in California, namely: (1) timber, (2) timber cut-over, (3) brush, (4) stream, and (5) Ribes inerme swamp. The first three are termed upland types in contrast to stream and swamp type. A description of these is given in the appendix. In several of the reports required the checking data are summarized for each eradication type (see section V, A and B).

B. Regular checking.

1. Upland checking.

Percent of check. A minimum of 4 percent of the acreage of all upland types is examined by this check. A 4 percent check of a section requires that 13 strips be run at 6-chain intervals, the first being 3 chains and the last 5 chains from the section line. When the quarter section is used as the checking unit, 7 strips are run; the first and last are 2 chains from the section or center line respectively, and the intermediate ones are six chains apart as before.

Examples

To find the number of strips per section:

640 acres x 4% = 25.6 (or 26) acres to be examined by strips. Area examined on each strip = 80 chains x $\frac{1}{4}$ chain = 20 sq. chains, or 2 acres. 26 acres divided by 2 acres = 13 strips required to give a 4% check of a section.

To find the acreage in any given length strip:

Given a strip 60 chains long (1/4 chain wide): 60 ch. x 1/4 ch. = 15 sq. chains. To find the number of acres, divide 15 by 10 (10 sq. chains = 1 acre) which is equivalent to pointing off one decimal place to the left. Thus there are 1.5 acres in 60 chains of strip distance.

Direction of strips.- Strips are run in cardinal directions, that is, either north and south or east and west, and the choice between these two should be that direction which will give the most accurate picture of the area. For example, strips should, in so far as possible, cross crew lanes at right angles. Were they to be run parallel to crew lanes, a check on a single day's work only would result for any particular area. Furthermore, strips should be run at right angles to the general trend of the topography in so far as this does not conflict with the preceding rule.

Example of upland checking.- To illustrate the procedure used, a typical case will be taken and a checker beginning at the southwest corner of a section will be followed through a strip. Having decided upon a north and south course, the checker offsets 3 chains east along the section line and establishes his starting point which he marks by placing on the string line a tag bearing the number of the strip, the course followed (as due north), the section, the distance to the nearest corner, his name, and the date. Setting his tally register at zero and obtaining a bearing due north with his compass, he proceeds north on the line thus established, checking off on the tally register the number of paces he takes as a measure of distance. As many shots are taken with the compass in the course of the strip as are necessary to maintain an accurate line. Since the checker's strip is no more nor less than a continuous line of sample plots one chain long by 1/4 chain wide, the checker from the very beginning carefully searches for Ribes bushes $8\frac{1}{4}$ feet on either side of the center line, and records them immediately by species and size (feet of live stem) in the proper transect on his data sheet. At 40 chains out he paces west to the quarter corner (this need be done on the first and last strips only) and makes corrections in his line for distance and alignment. Another tag is placed at the crossing of the center line. At 80 chains out he has not yet reached the red string marking the boundary of the section, so continues on and crosses it at 82 chains. The apparent error of two chains may be due to inaccuracy in the checker's pacing, to an incorrect position of the string line, or it may be possible that the section is 82 chains long. Pacing west to the section corner the checker determines the source of error and places in his notes the falling of his line as, for example, pacing short 2 chains; the error in alignment is shown on his map.*

*Errors in pacing should be adjusted by distributing them over the entire length of the line. Points can be moved forward or backward on the strip a prorated amount to their approximate actual position.

The end of the strip is marked with another tag. Offsetting east from the section corner 9 chains, he establishes and tags the starting point of his second strip and, paralleling the first, returns through the area recording data as before and closes to the initial point of the first strip. This process is repeated until all 13 strips have been run and the check is completed. By frequently closing on land survey corners and initial points of previous strips correctly located, accurate checks are kept upon the pacing of strips; it is important that this be done.

Outline of Important Points

(a) The checker secures the acreages and boundaries of eradication types from the camp foreman and uses them as authoritative. He plots the boundaries on his map before ever going into the field and does not change them, regardless of discrepancies he may find, except in conjunction with the camp foreman.

(b) Stream type is checked before upland types, hence when streams are crossed in the course of an upland check, no data are taken in stream type, and that particular transect (or transects) is labeled "No data - stream type", and its area deducted from the acreage for the strip.

(c) Mark in the field the beginning and finishing point of each strip as described above.

(d) In case the string line marking the boundary of a section does not follow the exact course of the section line, begin and end the Ribes count on the string line. This must be done in order to conform to the area actually covered by crews. For the purpose of completing the map, however, continue the strip until the section line is reached.

(e) Before checking an area, it is advisable to let two or three days elapse after the withdrawal of the last eradication crew to allow pulled bushes to die completely. This tends to prevent the confusion of recently pulled, fresh-appearing plants with bushes actually missed. Do not, however, postpone too long the work in outlying sections, but utilize to the fullest extent the transportation facilities afforded the eradication crews.

(f) Since variations in the width of the strip will greatly influence the Ribes count, check the width frequently by pacing out $8\frac{1}{4}$ feet on each side of the center line. In searching for bushes, cover the entire width of the strip, do not slight the outer edge which is just as important as the center, though not perhaps so readily visible.

(g) The checker should remember that his first duty in the field is searching for Ribes; the running of the strip itself is merely a means to that end. He should not allow himself to become so engrossed in the mechanics of strip-running that looking for bushes is slighted.

(h) Occasionally, generally poor eradication work may be found over an entire block. When the checking data indicate that such an area consistently exceeds 25 feet of live stem per acre, only sufficient strips should be run to show that rework is necessary. It would be wasted

effort to run a 4 percent check on an area that obviously requires reworking.

(i) If pulled bushes are found without roots attached it may indicate that the crowns were left in the ground. Ascertain if this is the case, and make notes, as described under "Recording of Data", on the number of crowns remaining in the ground. This should be reported immediately to the camp foreman and to no one else.

(j) Be on the watch for concentrations of missed bushes on either side of the strip, and if you see Ribes in the distance, go over and scout the vicinity. If a patch of bushes is found, plot the spot on your map and refer it to a landmark. The camp foreman will then be better able to find it.

(k) Ribes are found in particularly all sites and under all varieties of conditions. Look with particular care, however, in the following situations where they are very likely to be found and most easily overlooked.

1st. Under logs and down-timber.
2d. Around the roots of windfalls.
3d. Rotten logs and stumps.
4th. In the herbaceous vegetation of stream banks.
5th. Depressions and seepages.
6th. Openings in brush and reproduction.
7th. Outer fringes of brush patches.
8th. In the midst of ceanothus bushes and beneath their low-lying branches.

2. Stream type checking

Stream type usually represents a high original concentration of bushes, hence it is desirable to examine it more thoroughly than upland, and therefore separately; furthermore it is customarily checked first. Using the following system, the percentage of check will automatically be higher than that for upland work, varying from 10 to 15 percent.

Standard method.- In checking stream type the traverse is used as the standard method, the strip being run in such a manner as to give an adequate and representative sample of Ribes conditions along the stream. The principal difference from the upland method is that the strip is not run in a continuous straight line, but is really a traverse from one edge of the type across the stream to the opposite edge, back again, and so on, so that the pattern presented is that of a zigzag line. The transects, however, are consecutive as before and identical in size.

Representative sampling.- To obtain a representative sample the strip must cross the type sufficiently often. For example, a complete crossing from one outer edge to the other should be made once for every 5 chains of strip distance although this depends somewhat on the width of the type, the narrower the width, the more frequent the crossings. For wide stream type a complete crossing need be made, say, only once in 8 or 10 chains of distance.

If repeated crossing of a stream is impracticable, work each side separately, the strip zigzaging diagonally from bank to outer edge of type and back.

It is preferable that checking be done by proceeding up stream.

Numbering of strips.- Within a section each major stream and each tributary that has been classified by the eradication personnel as stream type is checked separately, and each requires a separate strip. Strips should be numbered in order beginning with the main stream and proceeding around the drainage. In specific instances, if more advantageous, the quarter section may be used as the checking unit as in upland checking.

3. Rechecking.

Areas which do not conform to the required live-stem-per-acre standard after the first check will be reworked by the eradication crews and then must be rechecked. Two or more reworkings are sometimes necessary, with a corresponding number of checks, before an area can be pronounced to be in a satisfactory condition. The different checks are designated thus: first check follows first Ribes eradication; second check follows second working of an area (first rework); third check follows third working, and so on.

Since the Ribes live-stem standard required that any 20-acre block be reduced to the established limits, 20 acres is the smallest unit for rechecking, and also the one most frequently used. The same procedure is followed as in the first check, except that the new strips should not retrace the exact courses of the original ones, but should be offset one chain or run at right angles to them if the direction of the crew lanes has been changed.

Rechecking in most cases takes precedence over first checking of other areas. It should be finished as quickly as possible so that further reworking can be undertaken if necessary, and the checking data for the section be complete in every detail.

C. Advance checking.

Requests for advance checking will be made by the camp foreman to the checking foreman who will assign the work to the checker. The checker may, upon authority from the checking foreman, receive requests direct from the camp foreman and begin the check.

The same procedure is used on individual strips as for upland checking on worked areas, with the following differences:

1. Type boundaries.- Sketch on the map in the field the boundaries of the eradication types as you encounter them; these may later be changed when the eradication men work the section. At the time the advance check is made, however, the types have not yet been mapped.

2. Procedure.- Begin the check with strips 10 chains apart (begin $2\frac{1}{2}$ chains from section or quarter lines); this is equivalent to a $2\frac{1}{2}$ percent check—8 strips per section.

If these strips reveal a general distribution of bushes averaging more than 25 feet of live stem per acre (see section VIII, B, Ribes Live-Stem Standards), no more strips need be run and the advance check may be discontimued.

If, however, few bushes are found and their distribution is such that additional corroborative information is necessary, strips are run between the original ones giving a spacing between strips of five chains. In no case are Ribes-free areas delimited on anything less than a 5 percent check (16 strips per section). It may happen that additional strips need be run in only a part of the whole area (see advance checking example).

3. An alternative method (to No. 2) is to begin with strips at 5-chain intervals, increasing this to 10 chains when adjoining strips show a general distribution of bushes averaging more than the allowed standard.

4. It is advisable that the direction of the strips be at right angles to the proposed direction of the crew lanes so that the starting points established for the strips may be used for subsequent checks. Consult the camp foreman in this connection.

5. Any area of 20 acres or more can be advance-checked, but in most cases units larger than 20 acres are used.

6. Ribes data are taken at stream crossings and a note made to the effect that the data refer to stream type. There is no advance check in stream type.

7. Upon completion of the check, the camp foreman outlines on the field map the areas he wishes to block out from crew work. The strip data for these areas only are then transferred to the field map of the section for regular checking. No further checks are conducted on blocked-out areas, but on those parts of the advance-checked area not eliminated from crew work, checking will, of course, have to be done following such work.

Advance Check Example

Eight strips spaced 10 chains apart are run through a section. In the north half numerous Ribes are found throughout each strip; therefore this area will obviously have to be covered by eradication crews, and additional strips are unnecessary. In the south half, the bushes are generally few and irregularly scattered, and parts of adjacent strips show no bushes. In this case more strips are required to definitely delimit the areas averaging less than 25 feet of live stem per acre. Therefore 8 more strips, spaced evenly between the first, are run in the south half and the results given to the camp foreman who is responsible for eliminating from crew work those areas relatively Ribes-free. These blocked-out portions have had a 5 percent check, so in this case the advance check takes the place of a regular check, and the strips and data (for blocked-out only) are plotted on the final map.

V. Recording of Data

A. Daily checking record.

AA. General Instructions

This form is used in the field to record all types of checking data: regular, including upland, stream, and rechecks, and advance check. The following points will guide the checker in filling it out correctly. Study carefully the sample form in the appendix.

1. On the front side of the form fill out the heading completely.

2. Place the strip number in the first column; strips are numbered consecutively for each section. Skip two lines between the data of different strips.

3. Opposite the strip number on the same line, give the location of the starting point, the course followed, and the date the strip was run.

4. In the second column place the transect (chain) number using one line to a transect except where no Ribes are found, in which case the consecutive transects are combined, as 6-10, and no data appear on that line. The number of the transect corresponds to the distance in chains from the starting point. A transect is one chain long by 1/4 chain wide (66 ft. by 16½ ft.). Do not divide transects between types, but account for them entirely in either one type or the other.

5. Opposite the transect number record in feet of live stem by species the size of each Ribes bush found in that transect, each entry representing one bush. Measure live stem to the nearest foot only. Do not record bushes of the current season's germination which may be distinguished by their small size (1 or 2 inches in height); few and small leaves; slender, green, herbaceous stem (not in the least woody); and by their frequent occurrence massed together in patches. The order of recording species is: (1) Ribes roezli; (2) R. nevadense; (3) R. viscosissimum, and (4) R. inerme; since it seldom happens that five species will be found on one strip, the last column may be reserved also for R. cereum.

Estimating live stem.- Live stem is the living stem and branches appearing above the ground and is measured in linear feet as though all the branches were torn apart and placed end to end. The petioles of leaves are not counted.

The importance of estimating accurately the feet of live stem cannot be over-stressed. Preface each day's work with a number of actual measurements of bushes so that your unit of measure may be the same from day to day. Do not fail to do this. The general tendency is to under-estimate live stem in large bushes and over-estimate it in small bushes. The live stem of all large bushes is obtained by first carefully estimating the number of feet in an average stem, and then multiplying by the number of stems. It is particularly necessary to be careful with large bushes because of the chance for error in reaching a correct figure and because of the great weight large bushes have in the per acre figures.

6. Record crowns left in the ground in a vacant column, using the symbol 1c, 2c, 3c, etc., "c" meaning crown and the prefix being the number

observed in the transect.

7. Under the heading "Computations by 5-Chain Transects", the first column locates the 5-chain transect and the other three are different types of totals of the Ribes information to be tabulated for every five chains of strip. The first 5-chain transect is designated by the number 5 and comprises transects (chains) 1 through 5, the second 5-chain transect is numbered 10 and includes transects 6 through 10, the third is numbered 15 and includes transects 11 through 15, and so on. This is merely a convenient way of summarizing by adding together the data for 5 consecutive chains.

The second and third columns are used only to summarize data for the following eradication types or subdivisions thereof (see section VIII, B, Ribes Live-Stem Standards):

(a) All cut-over areas except those on which the cover resembles that of the virgin forest.

(b) Brush type in which the predominating species is neither manzanita nor chinquapin.

(c) All stream type and R. inerme swamp.

Therefore, for strips or parts of strips within these types, summarize by 5-chain transects for the second column thus: add the number of bushes and the feet of live stem of all plants regardless of species having 3 feet of live stem or less, and express as a fraction, the number of bushes over the feet of live stem. For the third column do the same for all Ribes having more than 3 feet of live stem. The last column in the cases of types (a), (b) and (c) is the sum of the two preceding, but for all other types the total number of bushes and feet of live stem must be summarized and recorded here. Examine carefully the sample form for this point.

Bushes of 3 feet of live stem and less are not counted in determining the standard of work in types (a), (b) and (c), and hence must be kept separately for ready exclusion. However, when giving the number of bushes and feet of live stem remaining on an area, always include those under 3 feet of live stem unless specifically requested to the contrary.

To separate the transects falling within the above types from those without, draw a heavy line across the sheets at the points of separation.

Where a type line divides a 5-chain transect, summarize the data separately for that part of the transect on each side of the line.

BB. Specific Instructions for Different Types of Checking

1. Upland. No particular departures from the general procedure given above are observed in regular upland checking.

2. Stream type. Data are recorded as explained above and summarized by 5-chain transects.

3. Rechecking. New sheets are used for each number of recheck When filling in the sheet heading be sure to put the number of the check in red crayon so that it may be seen at a glance as-- "upland second check", "upland third check", etc. The original data that the recheck supplants now become obsolete; therefore, go back to the original sheets and draw a single red line through all the data thus replaced. Never destroy field records of any kind; always retain the data for all checks made. Clip the recheck sheets to those of the first check, thus all the data relating to one checking unit can be found together.

4. Advance checking. Mark advance check plainly on sheets in red crayon. In the computations by 5-chain transects, omit the second and third columns (summaries of bushes under 3 FLS and over 3 FLS, respectively), filling out only the last column, the summary of all bushes.

B. Section summary record.

When all the checks for an entire section have been completed, the final data for each type are summarized and entered on this form separately for areas blocked out and those covered by the regular check. Be sure that all substitutions of recheck data for original figures have been properly made. The simplest way to obtain the type summaries is from the 8-inch field map (see section VI, B, Field Maps) by scaling off the lengths of the strips falling in any type and adding the Ribes data corresponding to those lengths. Deduct from the lengths of the strips the average width of stream type in chains for every stream crossing.

Obtaining averages.- Show by type the actual number of acres examined on the strips and the total number of bushes and feet of live stem found, then reduce these latter to a per acre basis by dividing them by the strip acreage. When this is done for all types, add the bushes and live stem ("total" columns) for all the types and divide by the total strip acreage for all types. In this manner the per acre figures for the whole section are weighted. It is incorrect to obtain the grand average for the section by merely adding the averages for each type and dividing by the number of types. Do not average averages.

To find the average number of bushes per acre or the average number of feet of live stem per acre found on any strip (or strips) or on any area, the following formulae are used:

$$\text{Average number bushes per acre} = \frac{\text{Total number bushes in check strip (or strips)}}{\text{Number of acres in check strip (or strips)}}$$

$$\text{Average number feet of live stem per acre} = \frac{\text{Total FLS in check strip (or strips)}}{\text{Number acres in check strip (or strips)}}$$

Attach to the section summary record the data sheets for all types of checking done in the section, together with the field maps of the section. These then represent all the checking records for that section, and are filed in one large manila envelope.

C. Checker's man-day analysis.

This form is designed to be of assistance to the checker in keeping a record of his time by activities according to section, type of check, and eradication type. All of this is necessary in filling out the section summary record and the three tables of the monthly report. To be of any value, entries must be made daily.

D. Monthly report.

All computations in the various phases of checking work must be carefully done and thoroughly checked. This is nowhere more true than in the monthly report, the tables for which it is absolutely essential must check within themselves as well as with the original figures.

The monthly report form (see sample in appendix) shall be submitted to the checking foreman on the last day of each month, and since they must be summarized and sent to headquarters on the second day of each month, it is imperative that the report be not delayed.

All checking work performed on one camp area during the month is summarized on this form. If a checker moves from one camp to another, he summarizes only the data for the camp at which he is stationed at the end of the month including, however, all the work performed during the month by the man who preceded him. To facilitate summarizing, the checker, before transferring from a camp, shall prepare a statement on the monthly report form of all work he has done from the beginning of the month so that the record may be easily taken up from there and continued by whoever succeeds him. Otherwise confusion of the work of different men might easily result.

Both in table No. 1 and table No. 2 give the results by section, by number of check, and by type. The sample in the appendix will assist in using the form correctly. The data required for the monthly report are cumulative in nature: that is, for each section, the total man-days, acres covered, and acres in strips are given for any area each time a check is made upon it. For example, if a certain 40 acres is checked

---

Some figures for reference are:

1 chain = 66 feet.
80 chains = 1 mile (5,280 ft.).
10 square chains = 1 acre.
16½ feet = ¼ chain.
40 chains of check strip (40 transects) = 1 acre.
1 transect = .025 acre.
1 section = 1 sq. mile = 640 acres.

three times, that 40 acres will be reported three times, once for each number of check. This is not the case for the section summary record where the data represent the final check only, except for man-days which are specifically requested to be made cumulative.

In table No. 3 is to be summarized the time of the checker spent on different activities; use the data on the man-day analysis form as the basis for this. Report only 8 hours for each working day, 4 hours for Saturday, and be sure that the total number of days agrees with the total on the monthly time slip.

VI. Maps

A. General instructions.

1. The purpose of checking maps is to show graphically the amount and distribution of Ribes on an area at the time the check was made. They also show the location of streams, roads, trails, and the other major cultural features that will enhance the general usefulness of the map. However, Ribes data are of primary importance and they should not be obscured by a maze of topography and names. Other information that is necessary should be shown with as little emphasis as possible and in such a way as not to detract from the Ribes picture. Checking maps are not only temporarily indispensible to both the checking and the eradication personnel, but when traced and filed at headquarters they are also permanently valuable as a record of eradication areas.

2. To be of value, a map must be accurate; and to be legible, it must be neat. Therefore, these two prime essentials of a map shall be insisted upon. Not everyone is a born draftsman, but two or three simple tools rightly used will go a long way toward securing neatness. A 3H or 4H pencil, a sandpaper pad for keeping the point sharp, and a soft eraser should always be carried in the field; a 6-inch pocket ruler will also be found useful.

3. A map is of little value if not kept up to date.

4. Avoid an elaborate type of lettering. A directional arrow is unnecessary since the top of the map is always north; if an arrow is needed, make it inconspicuous.

5. The check strips are the source of information on the location of streams, roads, trails, and the other important ground features (except eradication types). Intersections of the strips with these principal features are plotted on the field map as the strips are being run.

6. Complete agreement as to the location of type and block boundaries and the designation of eradication types must be made with the eradication maps prepared by the camp foreman. In case this cannot be done between the checker and the camp foreman, the matter should be referred to the checking foreman.

7. The checkers of adjoining camps must arrange to tie in their respective camp boundaries and match type lines.

B. Field maps - scale 8 in. = 1 mi.

1. Upland check. (See sample map.)

This is the map carried and prepared in the field. It is of one section only, on a scale of 8 inches to the mile and is made on regular drafting paper. All regular upland and stream type checks, including re-checks, are shown on this one map for each section; advance check has a separate map. (The procedure for handling stream-type data is described in the next section.) All lines and data are entered in pencil except the headings, which are entered in ink, and the boundaries of eradication types and blocked-out areas, which are in red crayon. When two checkers from one camp work in the same section, both keep a field map, one of which is made the master map. After each day's work all data are transferred to this master map, which then represents the combined work of both checkers.

Plotting of strips. Plot the exact course and location of each strip as it was run, showing the distance in chains of the beginning and finishing points from those of adjoining strips or from the nearest survey corner. The course of the strip as actually run seldom coincides with the course as planned, but plot only the former. Number the strips to correspond with the numbering in the notes. Indicate by a small arrow the direction in which each strip was run. (As a strip is being run it will be necessary to plot its planned course and mark off upon it 5-chain intervals to facilitate placing the intersections of streams, roads, etc. If the error in alignment is more than one chain, this course can be erased and the true one drawn in, transferring all data to it.

Plotting of data. On strips within eradication types (a), (b), and (c) described on page 9, for every 5 transects plot as a fraction the Ribes data for all bushes of more than 3 feet of live stem, the numerator being the number of bushes of all species and the denominator the total feet of live stem. Where a type line divides a 5-chain transect, plot the data separately for each side of the line. These figures may be found already summarized in the third column under "Computations by 5-Chain Transects" on the daily checking record. In these types the camp foreman bases rework on these figures only, hence the total number of bushes and live stem (including all bushes of less than 3 FLS) are plotted on the permanent map only, and do not occur on the field map.

For strips falling in all other types, the figures representing all bushes (more and less than 3 FLS) within the 5-chain transect are plotted. In this connection study carefully section VIII, Ribes Live-Stem Standards.

Show the cultural features of the section when they improve the usefulness of the map, as explained under "A - General Instructions" above.

Section lines. Before beginning the check, secure the bearings of the section lines (outline of the section) from the camp foreman or the best available source and draw the section on the map. If any significant discrepancies are found during the running of the strips, make corrections to fit the actual field conditions. Sections are not, by any means, always square, nor are the lines always 80 chains long, and hence the section acreage often varies, sometimes greatly, from 640 acres. The original land survey township plats and survey notes in the Forest Supervisor's office afford a great deal of help along this line, although they are not

infallible.

Study carefully the sample map in the appendix which gives the details of how the various data should be shown. Note that eradication type lines and the boundaries of blocked-out areas are in red crayon. The legend for the field maps is the same as that given on the sample final checking map.

Do not forget that type lines and other features on the section map must match those of adjoining sections.

The field map is to be drawn in the field from data secured in the field, and is not to be drawn in camp from memory.

2. Stream type check. The results of the check in stream type are placed on the regular section field map. The actual course of the traverse is not shown on any map; instead, the data are summarized by 10-chain transects (not 5-chain transects as on upland strips) which are marked off along the stream, and the data properly entered. The number of bushes is shown over the feet of live stem, with the stream separating the two figures as in the sample map. Since the 10-chain transects represent distance on the zigzag strip and not 10 chains along the stream, they are not according to scale but are somewhat diagrammatical.

A simple and sufficiently accurate method for spacing the 10-chain transects along the stream is this: scale off the length of the stream in chains and divide it by the number of 10-chain transects in the strip on that stream. The quotient is the actual length of the 10-chain transect in distance along the stream.

When stream type data on the map are likely to be confused with data on upland strips, prefix a small "s" to the fraction, and if necessary offset the figures somewhat and indicate by an arrow their true position.

3. Recheck. No new map is made for rechecks; instead, the data are incorporated into the regular section field map. The camp foreman will draw a broken line around the block to be reworked, and when the recheck is made, the original strips within are erased and replaced with the new strips and data. (The camp foreman may wish to outline in blue crayon the areas to be reworked so that they may stand out more clearly.) Thus any number of checks can be shown on this map which then represents the final status of checking at any given time and gives the latest information on Ribes distribution within that section. The number of the check is placed on the map and the strips are designated either by a continuation of the numbering used for original strips or by letters, preferably the former (even though the sample map uses letters). By numbering all strips in one section consecutively, ready reference is made easier.

To show recheck in stream type, inclose within parenthesis the length of stream rechecked and place just above one bracket the number of the check. This is illustrated on the sample map.

4. Advance check. A separate field map is required for advance checking, but in practically all respects it is similar to the map described

under upland check. However, for every 5 transects plot the Ribes data for all bushes found, regardless of type, that is, a total figure representing both the bushes of less than 3 FLS and those of more than 3 FLS.

The data for blocked-out areas are transferred to the regular section field map so that the record may be complete in every detail.

By an advance check there is often obtained the only accurate map of an area available to the camp foreman, and hence it is invaluable to him. It is important, therefore, that the checker take particular pains to secure a reliable working map showing all the principal landmarks.

C. Final checking map of camp area - scale 4 inches to the mile.

The final map constitutes the permanent record of checking; it is made up from the completed field maps and includes the whole camp area. When all eradication work has been completed on a section and all checks performed, the data representing the final check are transferred to the permanent map and drawn in ink according to the legend on the sample map.

There is one important difference between the final map and the field maps, namely, on the final map the figures representing the Ribes data are totals of all bushes in the 5-chain transects regardless of eradication type, those having more than 3 FLS and those having less. The map thus gives a picture of all bushes occurring on the strips regardless of size.

Keep this map up to date and follow the general instructions of part A.

VII. Responsibilities and Duties of the Checker

Aim of the checking organization.- It should be the aim of all members of the checking organization not only to perform the outlined work in the best possible manner, but also to cooperate to the fullest extent with the eradication forces. The checkers should realize that they are an integral part of the blister rust control program, whose job is not to check upon the work of any particular eradication crew but more correctly to appraise conditions on the ground after eradication. From this appraisal come recommendations as to the amount of additional work, if any, needed to meet the Ribes live-stem standards desired.

Formal requests for checking work, particularly advance check, shall be made by the camp foreman to the checking foreman, or in his absence to the checker.

Responsibility.- The checker is directly responsible to the checking foreman, receiving from him all orders relating to his work, and consulting him on all questions involving a departure from standard procedure or about the work in general.

Integrity of the checker.- The whole theory of checking is that of representative sampling. If the checker has reason to believe he is not

securing a representative sample, he should take steps to remedy it, or seek the advice of the checking foreman. Thorough honesty and accuracy are nowhere more important in the whole blister rust control program than here, where an error in the data is magnified many times when the sample is applied to the whole. If entire confidence cannot be placed in a checker's figures, he is more than worthless to the organization, for he is then allowing work to be done upon a false basis. After the data have been collected, thorough checking of all computations is an absolute essential to accurate work.

Neatness in the keeping of notes is another prime requisite. Scrupulous care should be taken to have all maps clearly legible and up to date. Institute a simple filing system by sections; a large manila envelope in which can be kept all the data pertaining to one section will suffice. Have all sheets correctly labeled so that anyone at all familiar with the job can correctly interpret them. Keep all data in the camp to which they belong. If a checker is transferred to a different camp, all records are left behind and should be in such shape that his successor will experience no difficulty in finding out what has been done.

Upon completion of a check, the data shall be made available as soon as possible to the camp foreman, who determines how much rework shall be done. After recommendations have been made by the checkers, the responsibility of reducing areas to a standard live stem limit rests entirely with the camp foreman. The checker, if necessary, assists in delimiting rework areas in the field.

Checking information not to be divulged indiscriminately.- A great deal of harm can be done by the checker unwisely and indiscriminately voicing his opinion on checking matters, particularly results, to those not entitled to the information, and in places where it may become subject matter for gossip. It is not the checker's business to interpret the results of checking (i.e., to say whether a good or bad eradication job has been done on a certain area), much less to cast about him remarks derogatory to the work of any particular crew, straw boss, or camp, or to any phase of the eradication work whatsoever. If he has any constructive criticism, it should be given to the checking foreman who is in a better position to evaluate it and who can secure for it due consideration. It is the worst possible policy to discuss and criticise in one camp the work of another camp. This is absolutely forbidden the checker. The object of checking is to secure certain data and present it in an impersonal way to those who can make the best use of it, namely, the camp foreman and eradication supervisors. When called upon, the checker can give his observations on an area. To summarize this paragraph-- do not talk about the results of checking in your camp, in another camp, in town, or anywhere else except to those qualified to receive them.

Daily location of checker.- In a notebook kept for the purpose, the checker shall, every morning before quitting camp, leave a description of his whereabouts for the day in case any of the supervisory personnel should wish to locate him. This book can be kept in a prominent place on the office desk where it may always be readily found.

Do not rush your work to the extent that it affects the accuracy of the data.

When there is no checking work to be done, the checking foreman shall place his men at the disposal of the eradication personnel.

Regular checking shall take precedence over advance checking except in cases where the camp foreman is urgently in need of advance check information and the regular check may be conveniently delayed.

To get a better understanding of his own job, the checker should familiarize himself with the Ribes Eradication Manual. Eradication types, methods of crew work, and other things that the checker should know are fully defined and described there.

All members of the checking organization are subject to forest and camp regulations. Smoking is not allowed outside the boundaries of regularly established camps.

VIII. Standards of Control

A. Relation of eradication costs to control.

The ultimate goal of Ribes eradication is the permanent extermination of all Ribes from control areas in order to protect the sugar pine on such areas from damage by white pine blister rust. To reach this goal the eradication program must first remove the original bushes growing on the area, and must cover the area again at subsequent suitable periods until new bushes have stopped appearing. When an area is placed in this Ribes-free condition, blister rust control has been established and thereafter the area is said to be on a maintenance basis.

However, when Ribes occur in their natural condition over large areas of forest land, it is found that their occurrence and distribution are determined by reasonably definite factors and that the only sort of control program which can be successful must be based upon a knowledge of these facts. A logical program of Ribes eradication must recognize the fundamental facts that Ribes are plant species which appear in the early stages of ecological succession following denudation of forested areas, that their persistence and reproduction are favored by the conditions represented by the early stages of such ecological succession, that they are able to persist as a component part of the flora of such forested areas only when the forest stand which follows denudation is relatively thin and that the only uniform exception to these conditions prevails along streams where conditions for growth, persistence and reproduction of Ribes are more or less continuously favorable. This means that some forest areas are now in that part of their rotation which offers unfavorable conditions to Ribes growth and regeneration and that one thorough eradication job will result in the permanent suppression of Ribes; while on other areas which now offer favorable conditions for Ribes growth, several workings will be necessary to reach the desired goal. The control plan must consider the status of Ribes development on an area, in order that the standards of work applied shall maintain a proper balance between costs (especially the initial working) and results accomplished.

Since results are largely measured by the permanency of the Ribes-free condition established, working methods which involve excessive searching for small bushes in areas favorable to continued Ribes development and working methods which do not involve a thorough working for areas unfavorable to continued Ribes development, result in a cost out of proportion to the protection obtained.

In setting up the control standards that follow, it was first necessary to broadly recognize two general stages in the development of the Ribes flora, namely: (a) Ribes population that is on the increase, and (b) Ribes population that has passed the peak in its development and is either only holding its own in competition with other forest plants or is being suppressed by them.

(a) Ribes population on the increase. Disturbances to forest and ground caused by logging and fire set up conditions favorable to Ribes growth, and the seeds of many seasons which have been stored in the duff soon germinate and produce new plants. Ribes seeds exhibit a remarkable ability to remain viable in the forest floor over long periods and to germinate and form new bushes when environmental conditions are favorable. These bushes grow rapidly and fruit abundantly and new bushes continue to increase until the timber stand closes and curtails their development. Also along stream bottoms conditions for the growth, persistence and reproduction of Ribes are usually favorable. Under those conditions, all Ribes might be removed one season and many new ones would appear within a few years. Several follow-up jobs are necessary and the objective of the initial eradication is to remove all large bushes in order to prevent the production of additional seeds.

(b) Ribes population on the decline. On most virgin-timbered areas where the forest canopy is generally unbroken, the competition of the cover type, accumulation of forest litter, and changes in light and moisture incident thereto represent growing conditions unfavorable to Ribes. Where Ribes are present, they originated during the younger and more open stages of the ground cover which preceded this unfavorable condition. In such situations they are barely able to maintain their position in the stand and under some conditions are even slowly being suppressed. Bushes in this classification grow but slightly from year to year and bear but a scanty fruit crop, if any, in contrast with the fast-growing, prolificly fruiting plants in logged areas. Practically no seedlings are produced under these conditions, and when a thorough initial eradication job is done, the Ribes-free condition thus set up will continue over a long period.

B. Ribes-live-stem standards.

In order to attain an eradication cost consistent with the final objective of the work, the above facts must be taken into account, and around them, and in accordance with pathological studies on blister-rust damage, the following Ribes-live-stem standards were evolved.

(a) Areas that may need only one working. For all areas on which the initial eradication represents the only general eradication necessary to establish a Ribes-free condition that will remain unchanged for an extended period (Ribes population on the decline) the Ribes must be reduced to an amount not to exceed an average of 25 feet of live stem per

acre. Pathological studies of white pine blister rust have shown that the eradication of Ribes to 25 feet of live stem per acre is sufficient to establish initial control. In the application of this 25-ft. limitation, it is essential to examine the distribution of missed Ribes on the checking maps in order to make certain no bad concentrations of live stem remain on any area, for it is possible to have an average well within the 25-ft. limits and still have restricted areas supporting an excessive amount of live stem. Areas not conforming to this standard must be reworked until they do. As a general working rule, any area of 20 acres or more in size must conform to the 25-ft. live stem per acre standard.

Under the above classification occur all virgin-timbered areas, old logged areas in which the cover again resembles that of the virgin forest, and brush fields in which the predominating brush species are manzanita and/or chinquapin.

(b) Areas that will need more than one working. For all areas requiring more than one eradication in order to secure permanent Ribes suppression, the 25-ft. rule will apply only to bushes measuring 3 feet of live stem or more.

Under this classification occur most logged areas and burns, brush types in which the predominating brush species is neither manzanita nor chinquapin, and all stream type.

In such areas the plan of work should be directed toward the removal of all large bushes and as many of those measuring less than 3 feet of live stem as is compatible with a reasonable cost. In other words, the crewman should pull these small bushes whenever he sees them but he should not intensively cover every foot of ground in order to find them.

APPENDIX

Definition of Terms

1. Acres covered (monthly report and elsewhere).

The total number of acres comprising any type, section or other unit that is checked is known as "acres covered". The acreage actually examined on the check strips themselves is a definite percentage of the acres covered by the check.

2. Acres in strips.

This is the actual acreage examined on the strips; it is the sum of the areas of all the transects composing the strips. It is found by multiplying the length of the strip (or strips) in chains by the width ($\frac{1}{4}$ chain) and dividing the product by 10.

3. "Blocked-out" area.

An area eliminated from eradication crew work (usually by advance check) because of low Ribes population. The standard for blocked-out areas is less than 25 feet of Ribes live stem per acre.

4. Checking unit.

That area checked as a whole; the unit for checking. The section is the unit for mapping and summarizing checking data; the quarter section is the unit by which much of the checking (strip running) is done, although the half section and section frequently find just as wide use.

5. Eradication type.

An area representing a distinct set of eradication working conditions and differing from other areas sufficiently to cause a material difference in cost. For example: the conditions in "brush" type vary so greatly from those in "timber" type that the cost of Ribes eradication is much greater in the former. The case is similar to stream type and timber cut-over. Five types are recognized in California; they are defined as follow:

(a) R. inerme swamp type.- This is a relatively infrequent type occurring from the Tahoe Forest northward. In the more or less swampy ground bordering sluggish streams generally in or adjoining meadow lands occur dense masses of Ribes inerme intertwined so closely with thickets of willow and other species of brush that the associated brush species must be eradicated along with the Ribes. Special slashing eradication methods must be used in this type.

(b) Stream type.- A narrow belt of land along streams, draws, and swamps, varying in width with the topography, along which occur concentrations of Ribes in association with willows, alders, and annual plants.

(c) Timber cut-over type.- All lands which have been logged fall into this type except (1) those lands on which logging was done so long ago that a timber stand again occupies the ground and the favorable Ribes conditions set up by logging have reverted to those prevailing in the virgin forest, and (2) old logging areas on which no timber reproduction is coming in and on which occur instead fields of brush. The first of these exceptions should be classified as timber type and the second as brush type. Cut-over type is characterized by heavy Ribes, debris, and brush.

(d) Brush type.- All areas where the ground is partially or completely covered by brush, with trees or reproduction entirely absent or too sparsely present to revert to timber type for many years to come. Ribes are moderately abundant and usually increase in numbers toward the margin of the type where the brush is less dense.

(e) Timber type.- This is the most common type and is represented by all virgin-timbered areas or very old cut-over areas on which the timber cover and Ribes distribution again resemble those of the undisturbed forest. The distribution of Ribes and brush varies considerably depending upon exposure and the density of the timber stand.

Areas that have been burned should be classified under the one of the above types most accurately depicting the conditions on the burn. For example, an area on which a light ground fire had occurred killing no large trees and resulting in no heavy influx of Ribes would be classified as timber type. A burned area on which the timber cover was generally killed would be classified under cut-over type if any living trees were present, and as brush type if all trees were destroyed and brush was taking over the area. In these latter two instances Ribes are present in moderate to dense concentrations.

(f) Live stem.- Ribes live stem refers to the living stem and branches appearing above the ground, and is measured in linear feet as though the branches were torn apart and placed end to end. "FLS" = feet of live stem.

(g) Percentage of check.- This term refers to that fraction of the eradication area actually examined or to be examined by check strips. The acreage of the check strips in any unit divided by the total acreage of that unit gives the percentage of check.

(h) Transect.- A sample plot 1 chain long by $\frac{1}{4}$ chain wide (66 ft. x 16$\frac{1}{2}$ ft.) which is the unit for recording Ribes data. The check strip is one complete succession of transects. The "5-chain transect", used only in summarizing strip data, is merely 5 consecutive 1-chain transects taken together as a unit.

(i) Worked area.- This refers to the area covered by eradication crews, hence those areas on which Ribes have been eradicated.

INFORMATION ON PACING, COMPASS WORK AND PUBLIC LAND SURVEYS

I. Pacing

Pacing is the method of measuring distance by counting steps of a known length. It is usually employed to measure horizontal distances and while it is not as accurate as instruments, a man with practice can obtain a degree of accuracy that is suitable for rough work.

A. Procedure.

Although a pace is defined as one step, in general practice it is considered as two steps (a stride) or the distance between the heel of one foot and the heel of the same foot when it next touches the ground. Since the length of pace varies with individuals, the best way for a man to ascertain the length of his pace is to measure off on level ground a course of several chains and to pace this distance enough times to determine the number of paces per chain. A man should walk naturally while determining his pace as this results in each pace being more nearly the same length. To be able to pace under adverse conditions with the required degree of accuracy, it will be necessary to pace over measured courses running up and down slopes of different degrees and through brush to determine the allowance necessary under these conditions. Definitely known distances between points such as section corners offer a good opportunity to check pacing. The individual may find it necessary to increase or decrease the number of paces per chain during the summer.

B. Instruments used.

A box compass is ordinarily used to determine courses for pacing; it is as accurate as the pacing method of measuring distances requires. A description and discussion of the box compass appear later.

A tally register is frequently used to count paces and is usually carried in the left hand with the thumb working the lever each time the left foot touches the ground. The tally register should be checked every few chains to see if it is functioning properly as it is occasionally a source of error. Turn the register back to zero each time a new strip or line is being started to prevent error from this source. If it becomes clogged, wash it in kerosene and add a few drops of oil.

C. Factors influencing the accuracy of pacing.

There are several factors influencing the accuracy of pacing but with care these can be sufficiently overcome to obtain the desired results. They are as follow:

1. Topography. Land surveys are based on horizontal distances, consequently allowances at all times must be made in pacing for various degrees of slope. The number of paces per chain will have to be increased when traveling up or down slopes. Occasionally in rough country and in dense brush it is more accurate to estimate short distances than it is to pace them. Where difficulties are encountered it is always more accurate to increase the number of paces per chain or estimate the number of paces for short distances than it is to try to maintain the same length of pace that is taken on level ground.

2. Ground cover. Dense reproduction, brush or bear clover, or a combination of these make accurate pacing more difficult. This is especially true when they are encountered on a steep slope and additional care must be taken under these conditions.

3. Condition of soil. Loose, rocky, or swampy soils are more difficult to pace on than a firm, dry soil.

4. Rain and wind increase the difficulties of obtaining accuracy.

5. Human factors. A man's vitality may decrease after a hard day's work, a poor night's sleep or with physical illness and as a result he is apt to under-pace. On the other hand, in the morning, immediately after leaving difficult country, or when he is in a hurry, he is apt to lengthen his stride and over-pace. A man's pace is shorter when he is traveling slowly than when moving at his natural rate. Whenever a man leaves the compass line during his work, a mark in the duff, a pile of stones, or a stake should be left to indicate the point; otherwise the work must be redone or an error is likely to occur.

II. The Box Compass

A. Description of the compass.

The essential parts of the box compass are a magnetic needle for finding a meridian line, a horizontal graduated circle for laying off angles from this meridian and sights attached for use in prolonging lines on the ground. On circles graduated from 0° to 90° the 0° points are marked N and S and the 90 points are lettered E and W. Some compasses are graduated from 0° to 360° in which case the E point is 90°, S is 180° and W is 270°. Usually the north end of the needle is marked with an arrow and the south end is weighted with a wrapping of wire. The direction which the north end of the needle assumes is called the magnetic north. Since the needle always points to magnetic north and the box turns under it, the letters E and W on the box are reversed from their natural positions so that the reading of the north end of the needle will give not only the angle but also the proper quadrant. The angle between the magnetic north and true (geographic) north is called the declination of the needle. In California the declination varies from about 17° to 20° east of the true north according to the locality.

B. How to use the compass.

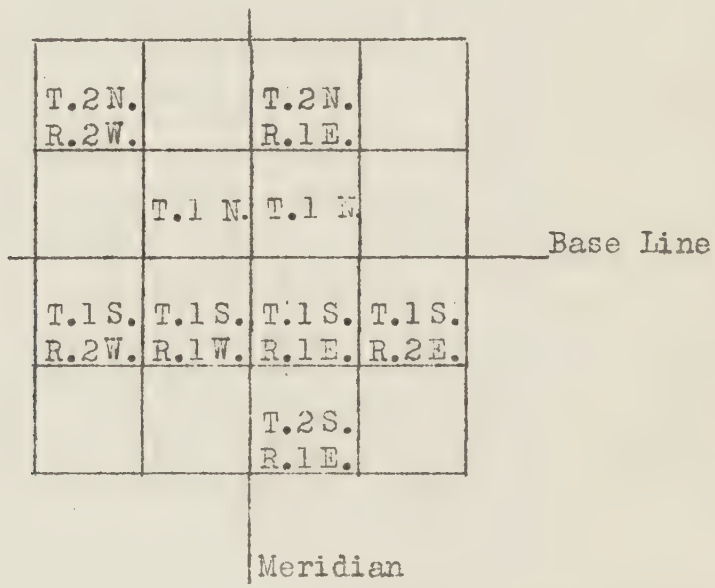
Before using the compass, the graduated circle must be shifted to the right (clockwise) until the declination reading coincides with the white line along the lid of the compass. Then when the needle points to 0°, the line of sight on the lid of the compass points to true north. Likewise when the needle points to E 90°, even though the letter is on the left side of the compass and pointing north, the line of sight is true east.

In taking a sight, the compass should be level, with the lid pointing away from the person's body until the north end of the needle comes to rest at the desired bearing. Then sight along the white line on the lid of the compass which is always the line of sight to be followed, and proceed in that direction. If the needle does not swing freely or is

caught, the small lug in the upper left corner will release it. Metallic articles that will attract the needle must be kept away from the compass or a false reading may be obtained. A moist finger touched to the glass of the compass will release any magnetism that might be affecting the needle. When the course has been determined, pick out an object along the line of sight as a guide and proceed to it, then take another sight, etc. For best results, the elbows should be held firmly against the body and the compass held in both hands. Before moving after taking a sight, the compass should be closed because this not only avoids injury to the needle and pivot but also saves time when the next shot is taken as this always leaves the needle pointing to the bearing of the line being followed. Time will be saved and certain errors avoided if the north end of the needle is always read.

C. Public land surveys.

Most lands in the United States have been surveyed under the rectangular system of public land surveys. The land is divided into townships which are usually six miles square. The townships are located north and south of a base line and east and west of a meridian by range. For example: township 1 north, range 2 east. The system of numbering is as shown below:

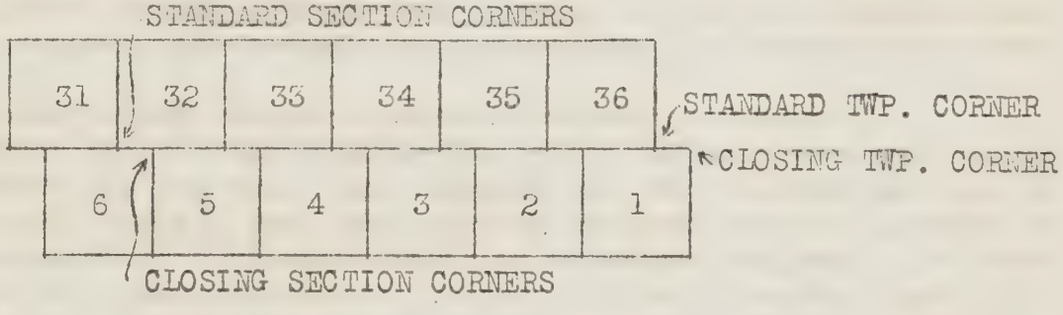


The township is divided into 36 sections which are usually one mile square. They are numbered as below:

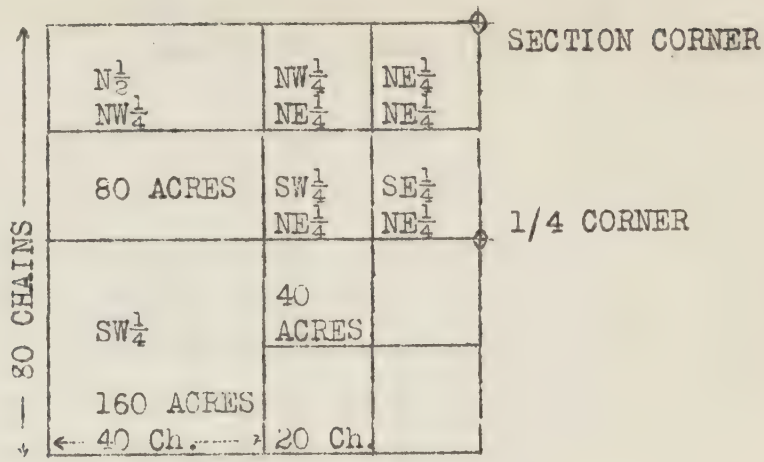
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

A section usually contains 640 acres and is 80 chains on a side but may often be irregular in shape and more or less than 80 chains square. Section lines are usually run in true cardinal directions, but may be several degrees off from the true line.

Corrections for cumulative differences and errors in the lengths of section lines are made along township lines, hence frequently section corners which should be common to the sections in two adjacent townships will not coincide. When this is the case, corners will be found for the sections in each township. These corners should all be shown on the map. The diagram below illustrates this point.



The section has the following subdivisions:



The maps of the area will usually show any inequalities in the township and sections.

Section lines and corners are the two most important landmarks to be found in the woods. Most of the boundaries used in blister-rust work are section lines.

Line trees are those directly on the section line; they are blazed on opposite sides, either with one or with three blazes one above the other, the blazes facing forward and backward along the line. Trees near the line are scored with two blazes (or two sets of three) quartering toward the line, and the farther the trees are from the line the nearer together the blazes are placed and vice versa. These blazed trees are of great use in marking and finding the position of a line through timber. Sometimes blazed lines are found in the woods which are not section lines; here care is essential or they are apt to cause a great deal of trouble. Scars due to fire or injury should not be confused with line blazes. Tally stakes may sometimes be found along the line. A tally is five chains.

An X or cruiser's tag on a tree along a trail or road designates a section-line crossing. The township, range and section are marked on the tag together with the distance to the nearest corner (usually) and a tack gives the location of the marker in a diagrammatic section.

Section and quarter corners in mature timber are designated either by a stake or a pile of stones and witness trees. The corner stake when present is scribed with the township and range and the sections to which it is common. Section corners usually have four witness trees--one in each section. These are marked with a blaze about 6" to 8" wide and 12" to 16" high about a foot above the ground. The blaze faces the section corner and is scribed with the township, range and the section in which the tree is found and is marked "B.T." (bearing tree). The old witness blazes are usually grown over forming a scar about 18" long. The witness trees are sometimes tagged with cruiser's tags and "Attention" signs. Many cruisers have marks (monograms) of their own that they cut in the bark of a tree near the corner. These marks often aid in locating a corner.

The quarter corner stake is usually scribed with the fraction 1/4 S. There are generally two witness trees, one for each section, which are blazed in the same manner as those for section corners and are usually scribed with 1/4 S above the letters B.T.

Do not blaze trees in the woods, particularly in the vicinity of section corners and section lines. Meaningless blazes too often obscure true survey marks and make their recognition and location difficult. Blazes in the woods should have a definite meaning.

Regular Forest Service trails are blazed with an inverted exclamation mark.

When searching for section corners, look for blazes, stakes, tags, cruisers' monograms and piles of rock. Do not give up too easily; search the ground thoroughly and systematically for at least seven chains in all directions from where the corner should be, since the pacing or alignment or both may be off. In logged areas most of the blazed trees have been cut, and even the corner and witness trees are occasionally destroyed. If this is the case, search the stumps for bearing tree blazes.

Corners, witness trees, section lines, etc. are usually found as described above but many variations occur.

WF-BRC-#232-4/19/35

DAILY CHECKING RECORD

Section 6
T. 24 N., R. 8 E.

Forest Plumas
Camp No. 7
Checker J. H. White

Type of check: Upland, 1st check

Strip No.	Trans. No.	Feet of Live Stem by Species: R. roezli	R. nevad.	R. visco.		Computations by 5-Chain Transects: Trans. No.	Bu. FLS 0-3'	Bu. FLS 3' +	Bu. FLS Total
		7/7/35 Running N.	from 3	ch. E.					
		of S.W. corner of	sec. 6						
	1	2,1,3	5	-	-				
	2-10	-	-	-	-	5	3/6	1/5	4/11
	11	3,1,7	-	-	-	10	-	-	-
1	12	-	8,2	-	-				
	13-21	-	-	-	-	15	2/3	3/20	5/23
	22	6,1,1,5	-	-	2C	20	-	-	-
		1,2,3	-	-	-				
	23	-	1,1	-	-				
	24-50	-	-	-	-	25	7/10	2/11	9/21
	51	15	-	-	-	30-50	-	-	-
	52	1,2	-	-	-	55	2/3	1/15	3/18
	53-80	-	-	-	-	60-80	-	-	-
		2 chains	short of	section line					
		7/7/35 Running S.	from 9	ch. E.					
		of N.W. corner of	sec. 6						
	1	-	-	-	-				
	2	1,7	-	-	-				
	3	2,8,1	-	-	-				
	4	1	-	-	1C				
	5	5,1	-	-	1C	5			8/26
	6	3,1,1,1	-	-	-				
	7-16	-	-	-	-	10			4/6
	17	-	-	3,1	-	15			-
	18	-	-	1,5	-	20			4/10
2	19-21	-	-	-	-				
	22	1,7,2	5	-	-	25			4/15
	23-36	-	-	-	-	30-35			
	37	3,10,1	-	-	-	40			3/16
	38	1,1	-	-	1C	40	2/2	-	2/2
	39-51	-	-	-	-	45-50	-	-	-
	52	-	7	-	-				
	53	1,2,3,1	-	-	-	55	4/7	1/7	5/14
	54-75	-	-	-	-	55			-
	76	13	-	-	-	60-75			-
	77	10,1	-	-	-				
	78-80	-	-	-	-	80			3/24
		1⅕ chains	short of	section line					

Strip No.	Trans. No.	Feet of Live Stem by Species				Computations by 5-Chain Transects			
		R. roezli	R. nevad.	R. visco.		Trans. No.	Bu. FLS 0-3'	Bu. FLS 3' +	Bu. FLS Total
		7/7/35 Running north from 15							
		chs. E. of S.W. cor. of sec. 6							
	1	1,2	-	-	-				
	2	10,1,1	-	-	-				
	3-6	-	-	-	-	5	-	-	5/15
	7	12,3	-	-	-				
	8	5,1,2	-	-	-	10			5/28
	9-17	-	-	-	-	15			-
	18	4,3,1,1	4	6	-	20			6/19
	19-25	-	-	-	-	25			-
3	26	1,2	-	-	2C				
	27	-	2,3	-	-				
	28	7,3	-	-	-	30	8/14	2/14	10/28
	29	1,1	-	-	-	35	1/3	1/16	2/19
	30	-	-	1,7	-	40-45	-	-	-
	31	16,3	-	-	-				
	32-48	-	-	-	-	50	-	-	-
	49	1,2	-	-	1C	50			2/3
	50-79	-	-	-	-	55-75			-
	80	6,1	-	1	-	80			3/8
		1/2 ch. long							
		7/8/35 Running S. from 21 ch. E. of N.W.							
		cor. of sec. 6							
	1-9	-	-	-	-	5			-
	10	5,2,1	-	-	-	10			6/19
4		1,7,3	-	-	-				
	11	-	7	-	-	15			1/7
	12-60	-	-	-	-	15	-	-	-
		-	-	-	-	20-60	-	-	-
	61	12,1	-	-	-	65	1/1	1/12	2/13
	62-80	-	-	-	-	65			-
						70-80			-
		Pacing OK							

WF-BRC-# 234-4/19/35

MONTHLY CHECKING REPORT

Month August 1935

Forest Plumas
Camp No. 7
Checker J. H. White

TABLE NO. 1 - Regular check

Twp. and Rge.	Sec.	No. of Check	Timber			Stream			Cut Over			Brush			Total		
			Man Days (1)	Acres Covered (2)	Acres in Strips (3)	Man Days	Acres Covered	Acres in Strips	Man Days	Acres Covered	Acres in Strips	Man Days	Acres Covered	Acres in Strips	Man Days	Acres Covered	Acres in Strips
24 N. 8 E.	19	1st	4-5/8	431	20.4	2-4/8	32	3.3	1-3/8	83	3.3	1	29	1.2	9-4/8	575	28.2
		2nd										4/8	20	1.0	4/8	20	1.0
		3rd							3/8	20	1.0				3/8	20	1.0
		All													10-3/8	615	30.2
	6	1st	4	250	12.5	3/8	10	1.2	1/8	20	1.0				4/8	280	14.7
		2nd	4/8	40	2.0										4/8	40	2.0
		3rd	2/8	20	1.0										2/8	20	1.0
		All													5-2/8	340	17.7
24 N.	5	1st	4-2/8	540	21.6	2	48	5.0							6-2/8	588	26.6
		2nd				1	16	2.0							1	16	2.0
		All													7-2/8	604	28.6
	7	3rd	4/8	37	2.0							3/8	22	1.0	7/8	59	3.0
Totals		1st	12-5/8	1,221	54.5	4-7/8	90	9.5	1-4/8	103	4.3	1	29	1.2	20-2/8	1,443	69.5
		2nd	4/8	40	2.0	1	16	2.0				4/8	20	1.0	2	76	5.0
		3rd	6/8	57	3.0				3/8	20	1.0	3/8	22	1.0	1-4/8	99	5.0
Grand Totals (4)			14-1/8	1,313	59.5	5-7/8	106	11.5	1-7/8	123	5.3	1-7/8	71	3.2	23-6/8	1,618	79.5

(1) Compute fractions of a man day in eighths.
(2) Acres covered means the total number of acres in the type or section that was checked.
(3) Acres in strips means the actual number of acres examined on the strips.
(4) Show grand totals in red crayon.

TABLE No. 2 - Advance Check

Township and Range	Section	Man Days	(1) Acres Covered	Acres in Strips	(2) Acres Blocked Out
24 N., 8 E.	19	1-5/8	160	8.0	65
	6	3-4/8	320	16.0	175
24 N., 9 E.	5	4/8	60	3.0	50
Totals		5-5/8	540	27.0	290

(1) Total acres covered by advance check.
(2) Acres blocked out refers only to the acreage actually eliminated from crew work by the camp foreman as a result of the advance check.

TABLE NO. 3 - Checker's Time Analysis

Activity	Man Days*
Regular checking	16-3/8
Advance checking	5-5/8
Eradication	3
Fire: Middle Fork	2
Black Cone	1
	28

*An 8-hour day; total days here should agree with the total number of working days reported on the checker's time slip.

Amount of monthly check $_____
(Exclude fire time.)

SECTION 19, T24N-R8E

REGULAR CHECK

CHECKING FIELD MAP

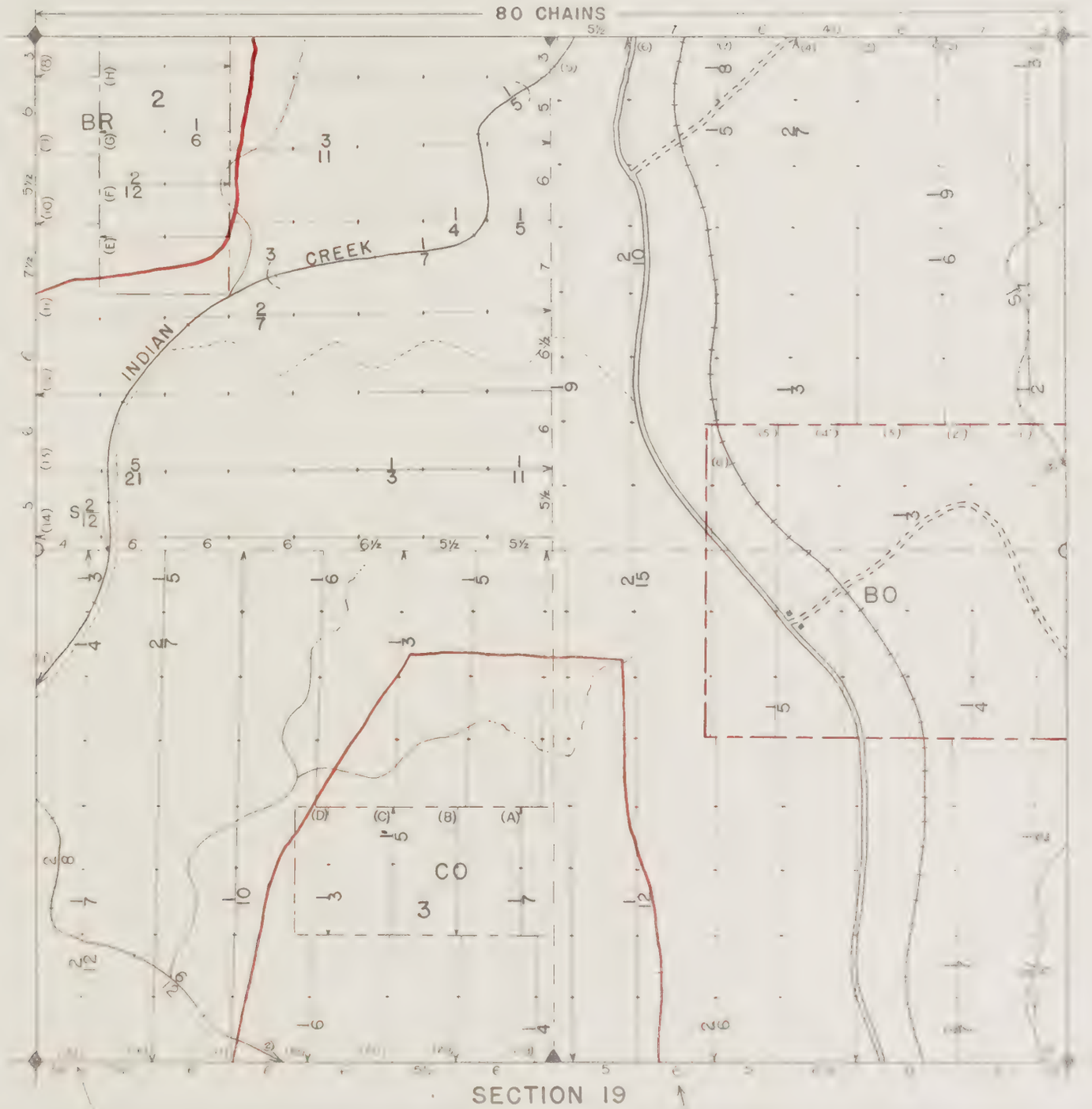
CAMP NO. 8

CHECKER J. N. ROBBINS

DATE AUGUST 1935

PLUMAS NAT'L FOREST

BLISTER RUST CONTROL



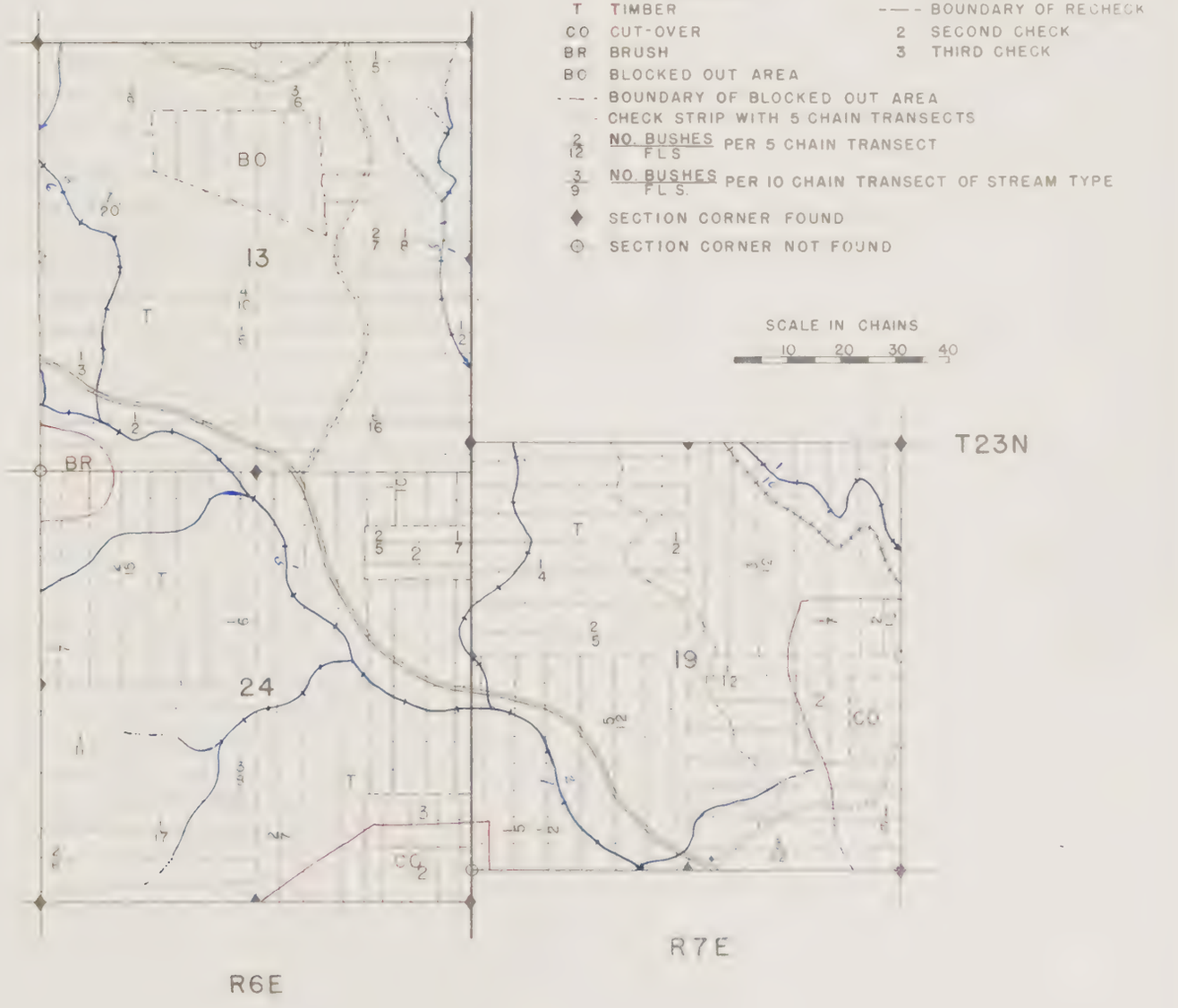
REPRESENTS NUMBER OF STRIP

DISTANCE BETWEEN STRIPS IN CHAIN

FINAL CHECKING MAP

CAMP NO. 5, SNAKE LAKE — PLUMAS NATIONAL FOREST

RIBES ERADICATION - 1935



I. WHITE PINE BLISTER RUST - LIFE CYCLE AND HISTORY

White Pine Blister Rust, the fungous disease which threatens destruction to the western white pine of the Inland Empire and the sugar pine of California and southern Oregon, can be controlled. The hope for effective control of this disease lies in the fact that a secondary host plant is necessary to complete the life-cycle of the fungus which causes the disease. The rust cannot spread from pine to pine; it must go through a stage of development on intermediate host plants, currant or gooseberry bushes, commonly known in control work as Ribes. While this disease can spread long distances from pine to Ribes, the spread from Ribes to pine can take place over relatively short distances up to only a few hundred feet. The fact that it is impossible for infection to spread from pine to pine, coupled with the short distance spread from Ribes to pine makes possible the control of this disease by the eradication of Ribes from within and around any stand of pine which warrants protection.

Blister Rust is slow but sure in action. While it may take twenty or thirty years to kill mature pine, the younger stands will be wiped out in a few years unless control measures are applied. The rust first appears on pines as a yellowish discoloration of the bark accompanied by a slight swelling. The canker continues to develop and spread until the trunk or branch is killed by girdling. Some branch cankers will spread to the bole and kill the tree. While this is taking place, the cankers are scattering Ribes-infection spores to the four winds through a fruiting process. Each spring small whitish sacs containing a reddish rust push their way through the diseased area of the bark and burst open, liberating millions of spores. These spores have relatively thick walls, live for a long time and can infect Ribes up to distances of more than 200 miles.

The rust appears on the under-surface of the Ribes leaf as orange-colored spots or pustules. This spring and early summer stage produces spores which can spread from leaf to leaf or locally from bush to bush. Later in the summer small hair-like columns grow from the diseased area of the leaf. These hair-like structures produce the only type of spore which can infect the pine. These spores have extremely thin walls and live for only a few minutes which explains the short distance spread from Ribes to pine. The disease enters the pine through the needles and grows in the inner bark becoming visible from 1 to 3 years after infection.

Blister rust has an interesting history. Commonly believed to have originated on Pinus cembra in Siberia, it was first discovered in the Baltic provinces of Russia in 1854 on both Ribes and pine. During the three decades following 1860, it spread generally over the range of pine in western Europe where during the middle of the 19th century the white pine of eastern America was used extensively in reforesting. Damage from blister rust has been so severe that the use of white pines in reforesting and the growing of white pines for profit have been largely given up.

While blister rust was taking such a heavy toll in Europe, the planting of white pine in the Eastern United States and Canada had increased so

rapidly that our nurseries could not supply the demand. During the last few years of the last century and early in the present century white pine was imported from Europe. Through this importation of nursery stock blister rust gained a foothold in eastern America about 1898. As the disease does not become visible until some time after infection, it is probable that the rust could not be detected when these imported trees were planted. It was discovered in the state of New York in 1906 on the cultivated black currant and in New England on native pines in 1915 and 1916. It has spread generally over the Northeastern states, southward as far as Virginia and westward into the Lake states region where it was located in 1916.

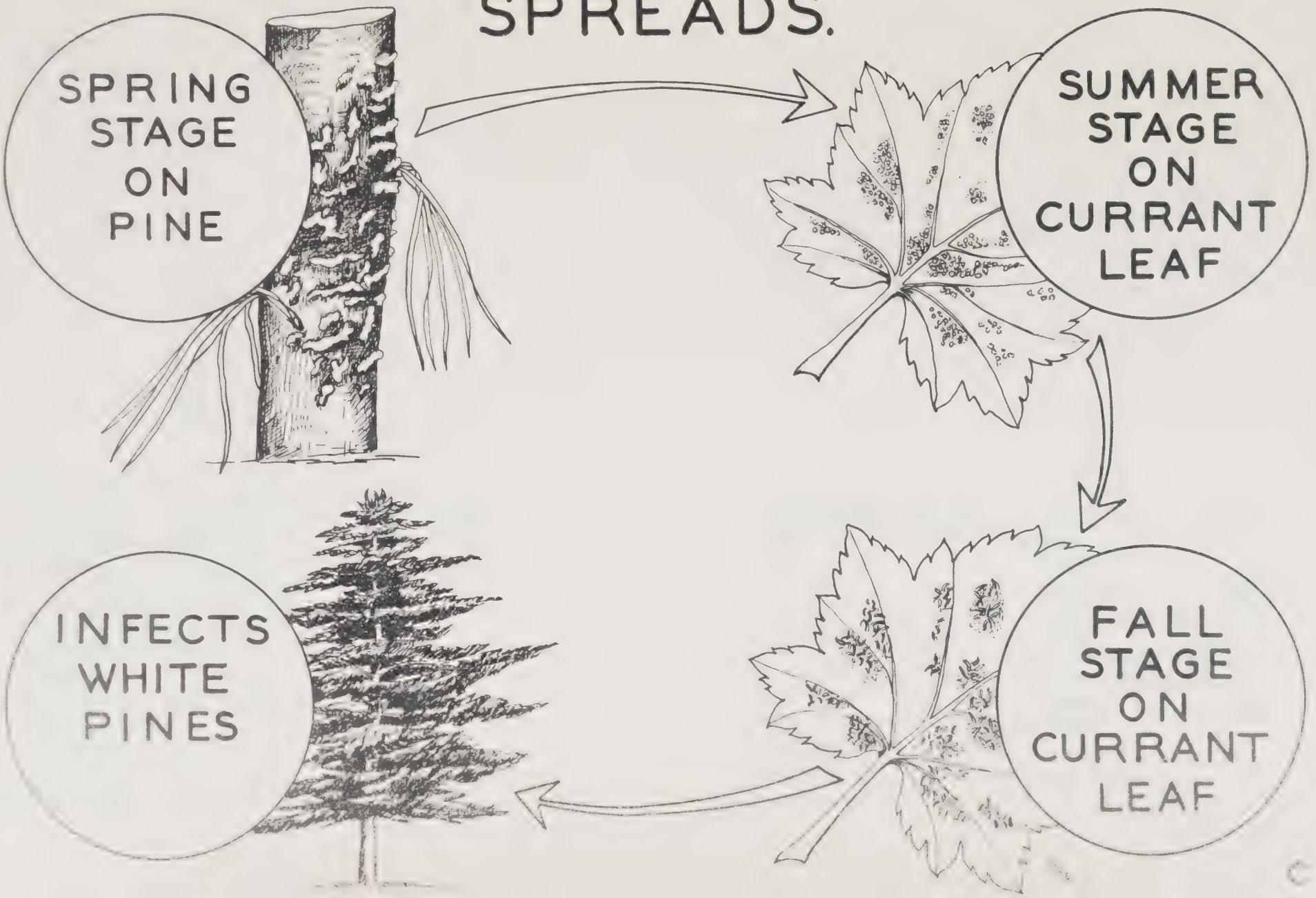
The spread of blister rust to the West from eastern infection centers was prevented by the strict enforcement of quarantine laws which prohibited the shipment of host plants to points west of the Mississippi. The rust became established in the West however in the same way as in the East, by the importation of European nursery stock. Discovered at Vancouver, B. C. in 1921 the rust was traced to a shipment of pines from France to Vancouver in 1910. Since its introduction blister rust has spread eastward through the interior of British Columbia to the Inland Empire and southward through the coastal region of Washington and Oregon almost to California.

While the rust became established in the Inland Empire in 1923 it was first located in 1927 on Ribes near the Falls Ranger Station on the Kaniksu National Forest, Idaho and in the spring of 1928 on pines at Newman Lake, Washington. Since that time 128 additional centers of pine infection have been found in the white pine forests of North Idaho, 15 of which originated in 1923. Ribes infection may be found each year generally distributed over the white pine belt of the Inland Empire.

The most southerly known pine infection center in the West was located in Oregon in 1934 on Steamboat Creek in the upper drainage of the North Umpqua River in Douglas County, approximately 100 miles from California. Infection on Ribes has been found on the Oregon coast less than 50 miles from the California line. Blister rust is not located usually for some time after its introduction to a region and while extensive scouting in northern California has thus far failed to reveal the presence of the rust, it is entirely possible that it has already become established in the sugar pine stands of northern California.

While control of this disease has not been attempted seriously in Europe, practical and effective control measures have been instituted in the eastern United States and are being developed in the Lake States. In the West conditions are entirely different to those in the East and the pine is more susceptible to blister rust. Several years experimentation and development have resulted in practical control methods, proper application of which with adequate follow-up maintenance work will result in protecting our valuable stands of white pine and will reduce a virulent type of forest disease to the status of a minor pest.

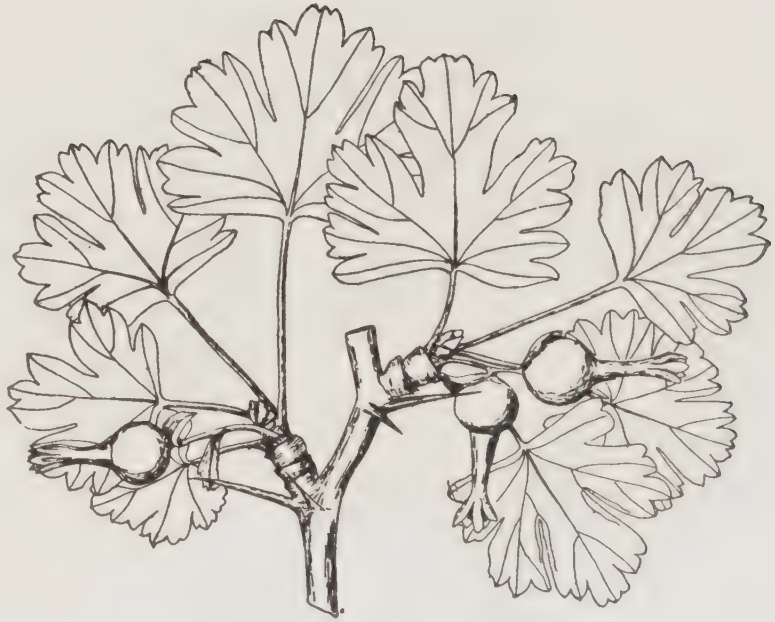
HOW BLISTER RUST SPREADS.



(1-1/3 Nat. size)

Ribes inerme (white-stemmed gooseberry)

1. Leaves - smooth, 5-lobed, deeply cleft, 1 to 3" broad, margins thin and large-toothed.
2. Stems - slender, usually erect, bark whitish, 1 to 3 short spines at nodes or wanting, spines softer and fewer than those on R. roezli.
3. Flowers - greenish or purplish, 1 to 3 in cluster.
4. Fruit - smooth, shiny, round, black or deep purplish.
5. Habitat - 3,000 to 8,000; swamps or bordering sluggish streams usually intermingled with willows, alders or other vegetation.



(2 X Nat. size)

Ribes lasianthum (gooseberry)

1. Leaves - generally hairy on both surfaces, deeply 3 to 5-lobed, roundish, 1/2 to 3/4" broad.
2. Stems - rigidly and intricately branched, bark white and shreddy; 1 to 3 slender spines at nodes; rarely with prickles.
3. Flowers - clusters 1 to 3-flowered (rarely 3 or 4), yellowish, hairy and cylindrical.
4. Fruit - reddish or crimson berry--without hair or glands, round and small.
5. Habitat - open, dry sites only rarely found in the higher altitudinal range of sugar pine.

Compiled by
W.W. Spinney - Oakland 3/35

(Nat. size)

Ribes roezli (prickly-fruited gooseberry)

1. Leaves - smooth to densely hairy on both surfaces, 3-5 cleft into toothed lobes, seldom more than 1" wide, generally less.
2. Stems - stout and smooth, erect from ground tending to spread and droop. 1-3 spines at nodes.
3. Flowers - deep red or purplish, one or two in cluster, long, tubular.
4. Fruit - yellow or purple to deep red, spined berry, pleasant to taste, only spiny fruited gooseberry in S.P. type of Sierra Nevadas.
5. Habitat - generally distributed on all slopes and sites 3,000 to 7,000 ft.

(Nat. size)

Ribes nevadense (Sierra Nevada currant)

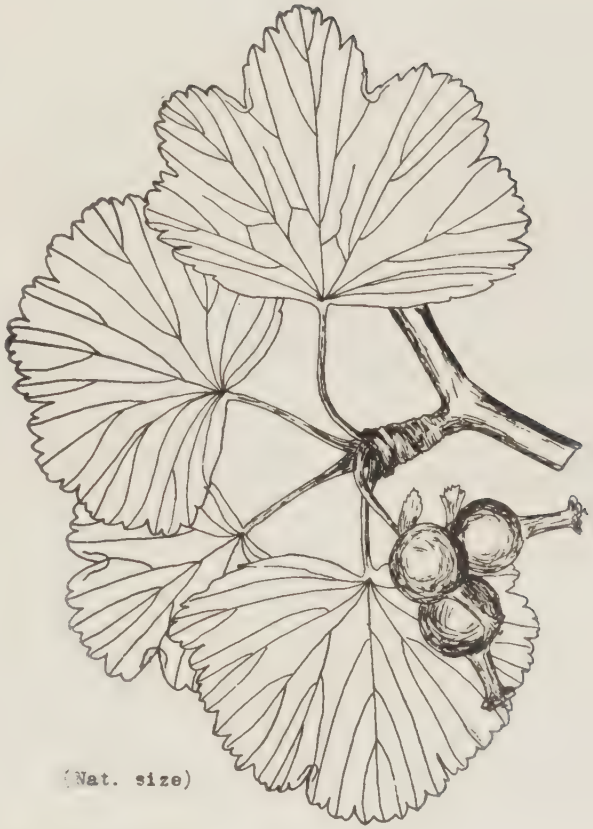
1. Leaves - smooth above and nearly or quite so below. 3 to 5 lobes slightly cleft, margins fine-toothed, 1½ to 3" broad, reclining.
2. Stems - slender and erect, smooth, no spines.
3. Flowers - rose color to red in many-flowered clusters.
4. Fruit - black with bloom, smooth, round, sharp musty taste.
5. Habitat - 3,000 to 7,000; abundant along streams and on wet sites.

Compiled by
W. W. Spinney. Oakland 3/38

(½ Nat. size)

Ribes viscosissimum (Sticky currant)

1. Leaves - thick, hairy and sticky, noticeable spicy or peppery odor when crushed. (shallowly, 3-lobed, rounded) 1½ to 3" broad, deep-veined, giving a crinkly effect.
2. Stems - smooth, erect but spreading, reddish, shreddy bark, no spines.
3. Flowers - light green, sometimes tinted with purple--3 to 13 flowered, erect clusters.
4. Fruit - black, sticky, oblong, noticeably ribbed, sticky hairs present.
5. Habitat - high altitude, under timber, all sites 4,500 to 5,500.



(Nat. size)

Ribes cereum (squaw currant)

1. Leaves - smooth, heavy odor but not so pronounced as R. viscosissimum; slightly sticky, wide, 3 or 5-lobed shallowly cleft. 1/2 to 1½" broad.
2. Stems - stiff, much-branched, smooth, no spines--always erect, but spreading.
3. Flowers - white or pinkish--clusters 2 to 9-flowered and drooping.
4. Fruit - red, round, smooth and slightly sticky.
5. Habitat - all high sites, 5,000 to 12,000 ft. in fir types.

Compiled by
W.W. Spinney - Oakland 8/26

WF-BRC-# 231 3/31/35

CHECKING FORM
SECTION SUMMARY RECORD

Section_____
Twp.____ Rge.____

Forest_____
Camp_____
Checker_____

Type	Areas Blocked Out							Regular Check						
	Man Days*	Acres Blocked Out	Acres in Strips	Totals		Per Acre		Man Days**	Acres in Type	Acres in Strips	Totals		Per Acre	
				Bu.	FLS	Bu.	FLS				Bu.	FLS	Bu.	FLS
Timber														
Cut Over														
Brush														
Stream														
Totals and Averages														

*Show here the total number of man days by type spent on advance checking in the section. Fractions of man days are shown in eighths, and to the nearest hour only.

**Includes man days on rechecking. This form should account for all checking man days spent on the section regardless of the kind of check.

JF-BRC-#232-4/19/35

DAILY CHECKING RECORD

Section__________ Forest______________________

T.____ , R.____ Camp______________________

Checker______________________

Type of check_____________________________

Strip No.	Trans. No.	Feet of Live Stem by Species: R. roezli	R. nevad.	R. visco.		Computations by 5-Chain Transects: Trans. No.	Bu. FLS 0-3'	Bu. FLS 3' +	Bu. FLS Total

		Feet of Live Stem by Species				Computations by 5-Chain Transects			
Strip No.	Trans. No.	R. roezli	R. nevad.	R. visco.		Trans. No.	Bu. FLS 0-3'	Bu. FLS 3' +	Bu. FLS Total

WP-BRC-# 233 3/3?/35

CHECKER'S MAN-DAY ANALYSIS

Month _____

Checker _____
Forest _____
Camp _____

Type	Activity		SECTION	Acres	SECTION	Acres
Timber	Regular Check	1st				
		2nd				
		3rd				
		4th				
	Adv. Check					
Cut Over	Regular Check	1st				
		2nd				
		3rd				
		4th				
	Adv. Check					
Brush	Regular Check	1st				
		2nd				
		3rd				
		4th				
	Adv. Check					
Stream	Regular Check	1st				
		2nd				
		3rd				
		4th				
	Adv. Check					

Eradication _____

Fire _____

Type	Activity		SECTION									Acres										Acres
Timber	Regular Check	1st																				
		2nd																				
		3rd																				
		4th																				
	Adv.Check																					
Cut Over	Regular Check	1st																				
		2nd																				
		3rd																				
		4th																				
	Adv.Check																					
Brush	Regular Check	1st																				
		2nd																				
		3rd																				
		4th																				
	Adv.Check																					
Stream	Regular Check	1st																				
		2nd																				
		3rd																				
		4th																				
	Adv.Check																					

INSTRUCTIONS

In the proper square place the day of the month over the number of hours.

Show time to the nearest hour only and not more than 8 hours for any one day; Saturday 4 hours.

Travel time and office work done during the regulation 8-hour day should be prorated to the field work, i. e., to type of check by section.

When the checker moves from one camp to another, he should make a copy of this form to take with him so that he has at all times a complete record of his work; the original is a part of the checking records of the camp he leaves. When more than 4 sections are worked in during one month, continue the record on another sheet.

WF-BRC-# 234-4/19/35

MONTHLY CHECKING REPORT

Forest____________________

Camp____________________

Checker____________________

Month__________

TABLE NO. 1 - REGULAR CHECK

Twp. and Rge.	Sec.	No. of Check	Timber			Stream			Cut Over			Brush			Total		
			Man Days	Acres Cov-ered	Acres in Strips	Man Days	Acres Cov-ered	Acres in Strips	Man Days	Acres Cov-ered	Acres in Strips	Man Days	Acres Cov-ered	Acres in Strips	Man Days	Acres Cov-ered	Acres in Strips

TABLE NO. 2 - ADVANCE CHECK

Township and Range	Section	Man Days	(1) Acres Covered	Acres in Strips	(2) Acres Blocked Out
Totals					

(1) Total acres covered by advance check.

(2) Acres blocked out refers only to the acreage actually eliminated from crew work by the camp foreman as a result of the advance check.

TABLE NO. 3 - CHECKER'S TIME ANALYSIS

Activity	Man Days*
Regular checking	
Advance checking	
Eradication	
Fire:	

*An 8-hour day; total days here should agree with the total number of working days reported on the checker's time slip.

Amount of monthly check $_____
(Exclude fire time).

WF-BRC-#235-6/3/35

CHECKING FOREMAN'S REPORT

Checker: _____ _____ Forest

Date			
Field Work			
Pacing			
Alignment			
Placing of tags			
Condition of notes			
Neatness			
Correctness			
Stream checking			
Rechecking			
Advance checking			
Field Map			
Neatness			
Correctness			
Adv. Check Map			
Neatness			
Correctness			
Records			
Section summary			
Man-day analysis			
Monthly report			
Final Check Map			
Up to date			
Drafting			
Correctness			
Check			
Percent bushes found			
F.L.S. estimation			
Strip distance checked			
Knowledge of manuals			
Cooperation			
Personal remarks:			

General remarks:

_____

Checking Foreman

WF-BRC-#235-6/3/35

CHECKING FOREMAN'S REPORT

Checker: _____ _____ Forest

Date			
Field Work			
Pacing			
Alignment			
Placing of tags			
Condition of notes			
Neatness			
Correctness			
Stream checking			
Rechecking			
Advance checking			
Field Map			
Neatness			
Correctness			
Adv. Check Map			
Neatness			
Correctness			
Records			
Section summary			
Man-day analysis			
Monthly report			
Final Check Map			
Up to date			
Drafting			
Correctness			
Check			
Percent bushes found			
F.L.S. estimation			
Strip distance checked			
Knowledge of manuals			
Cooperation			
Personal remarks:			

General remarks:

_____

Checking Foreman